MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

DSP5614 – PROBABILITY AND STATISTICS

(*for diploma students only*)

29 MAY 2019

9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **3** pages excluding cover page and appendix.

2. Attempt **ALL FOUR (4)** questions. The marks distribution for each question is given.

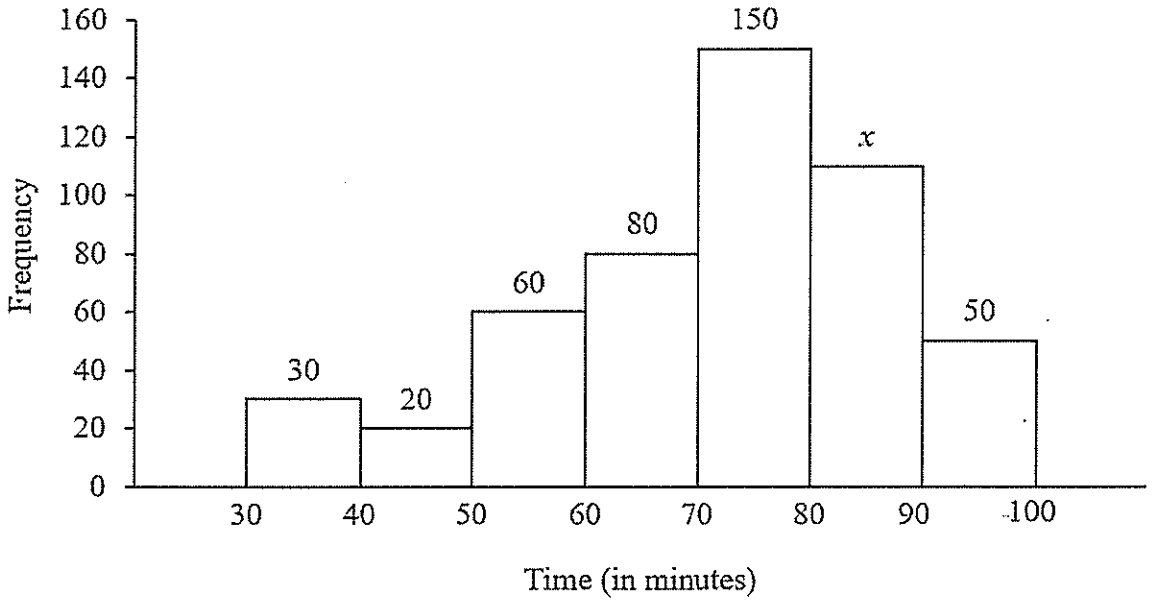
3. Write your answers in the answer booklet provided.

4. Key formulae are given in the Appendix.

Question 1

a) The following histogram shows the time taken (in minutes) during *Merentas Desa* event in one school and it involves a total of 500 students.

Histogram of time taken for 500 students in *Merentas Desa*



i. Identify the value of x if the total student is 500. (1 mark)

ii. Based on the above histogram, construct a table which include classes, frequency, relative frequency and midpoint. (6 marks)

iii. From table in part (ii), calculate the sample mean and variance. Round off your answer to the nearest whole number. (7 marks)

b) The following stem-and-leaf diagram presents the data of 15 Grab car drivers. It shows the amount of money (in RM) that they receive for one destination.

Stem	Leaf
1	0 5
2	2 4 8 9
3	1 3 5 5 6 8
4	0 7
5	7

Key: 1 | 0 = 10

i. Based on the diagram above, identify the 5-number summary. (8 marks)

ii. Find the interquartile range, lower and upper limit. (3 marks)

[TOTAL: 25 MARKS]

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Question 2

a) There are 56 cupcakes in a bakery. When a cupcake is chosen randomly from the bakery, the probability of getting a chocolate cupcake is $\frac{5}{8}$. Calculate the number of cupcakes in the bakery which are not chocolate. (4 marks)

b) Fiza made 2 attempts in a bowling practice. The probability that Fiza get a strike in an attempt is 0.3.

i. Draw a tree diagram with the probability value to represent the situation. (3 marks)

ii. Find the probability that Fiza get a strike on both attempts. (2 marks)

c) Given the probability of Mary adding sugar and/or creamer to his tea:

Adding	Probability
Sugar	0.33
Creamer	0.5
Sugar and creamer	0.25

Find the probability that Mary

i. does not add sugar. (2 marks)

ii. add either sugar or creamer. (3 marks)

d) Given the number of employees in two stores:

Store	Male staffs	Female staffs
P	9	M
Q	15	2

i. An employee is chosen at random from store P. The probability of choosing a female employee is 0.4. Find the value of M. (4 marks)

ii. Two employees are chosen at random. Find the probability that both of them are chosen from the same store. (4 marks)

iii. Find the probability of randomly choosing a female employee, given that she is from store Q. (3 marks)

[TOTAL: 25 MARKS]

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Question 3

a) Tesra has developed a new Beyblade that can last longer than the other brands in the market. A random sample of 100 unit of Tesra Beyblade can spin for an average time of 190.25 seconds. If the other brands in the market have an average time of 3 minutes and standard deviation of 45 seconds, can we accept the claim by Tesra at 5% significance level? (11 marks)

b) According to report published in The Economist, iPhone market share has been in declined since early 2018 where it drops to 13.5% in the last quarter of 2018. A recent survey done at Jusco Ayer Keroh on a random sample of 150 visitors found that only 18 persons uses iPhone. Based on this survey, can we conclude at 10% significance level that iPhone market share now is lesser compared to in 2018? (11 marks)

c) Calculate the p-value for a one tail test with test statistic $z_0 = -2.64$. (3 marks)

[TOTAL: 25 MARKS]

Question 4

Company XYZ producing a soft drink has in operation for more than three years. The units of soft drink produced (in 000) and total production cost (in RM000) are given in the following table.

Units of Soft Drink Produced (in 000), x	Total Production Cost (in RM 000), y
79	96
14	35
61	81
29	50
36	54
55	73
18	38
74	93
69	86
11	31
47	65
23	42

a) Calculate SS_{xx}, SS_{yy} and SS_{xy} based on the information given. (9 marks)

b) Calculate the correlation coefficient, r and interpret the answer. (4 marks)

c) Find the linear regression equation $\hat{y} = \beta_0 + \beta_1 x$. (5 marks)

d) Predict the total production cost if the units of soft drink produced is 39,000. (2 marks)

e) Compute the value of *SST*, *SSR* and *SSE*. (3 marks)

f) Calculate the standard error of the estimate, s_e. (2 marks)

[TOTAL: 25 MARKS]

End of question paper.

APPENDIX – KEY FORMULA

	Ungrouped Data	Grouped Data
Mean	$\bar{x} = \frac{\sum x_i}{n}$ where n : sample size	$\bar{x} = \frac{\sum m_i f_i}{\sum f_i}$ where m : class midpoint f : class frequency
Variance	$s^2 = \frac{1}{n-1}\left[\sum {x_i}^2 - \frac{\left(\sum x_i\right)^2}{n}\right]$ where n : sample size	$s^2 = \frac{1}{\left(\sum f_i\right)-1}\left[\sum {m_i}^2 f_i - \frac{\left(\sum m_i f_i\right)^2}{\sum f_i}\right]$ where m : class midpoint f : class frequency

NORMAL AND STANDARD NORMAL PROBABILITY DISTRIBUTION

- z-value (observed value) for an x value : $Z = \frac{x-\mu}{\sigma}$

HYPOTHESIS TESTING

Population	Mean	Proportion
1	$Z = \frac{\bar{x}-\mu_0}{\sigma/\sqrt{n}}$	$Z = \frac{\hat{p}-p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$ where $\hat{p} = \frac{x}{n}$
2	$Z = \frac{\left(\bar{x}_1-\bar{x}_2\right)-\left(\mu_1-\mu_2\right)}{\sqrt{\frac{{\sigma_1}^2}{n_1}+\frac{{\sigma_2}^2}{n_2}}}$	$Z = \frac{\left(\hat{p}_1-\hat{p}_2\right)-\left(p_1-p_2\right)}{\sqrt{\hat{p}_p\left(1-\hat{p}_p\right)}\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}}$ *where* $\hat{p}_p = \frac{x_1+x_2}{n_1+n_2}$

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LINEAR REGRESSION ANALYSIS

- **Least square regression equation,** $\hat{y} = \beta_0 + \beta_1 x$ where $\beta_1 = \dfrac{S_{xy}}{S_{xx}}$ and $\beta_0 = \bar{y} - \beta_1 \bar{x}$

- **Correlation coefficient,** $r = \dfrac{S_{xy}}{\sqrt{S_{xx} S_{yy}}}$ where

$S_{xx} = \sum x^2 - \dfrac{\left(\sum x\right)^2}{n}$	$S_{yy} = \sum y^2 - \dfrac{\left(\sum y\right)^2}{n}$	$S_{xy} = \sum xy - \dfrac{\left(\sum x\right)\left(\sum y\right)}{n}$

- **Sum of Square**

$SST = SSR + SSE$	$SST = S_{yy}$	$SSR = \dfrac{\left(S_{xy}\right)^2}{S_{xx}}$

- **Test of Significance for Regression Slope**

Standard Error, $s_e = \sqrt{\dfrac{SSE}{n-2}}$	Regression t-Test $t = \dfrac{\beta_1}{s_e / \sqrt{Sxx}}$	Correlation t-Test $t = r \cdot \sqrt{\dfrac{n-2}{1-r^2}}$

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